DESCRIPTION

PACKING MEMBER AND PACKING BODY

TECHNICAL FIELD

The present invention particularly relates to a packing member and a pallet, both of which are suitable for packing a hermetic compressor and capable of reusing, and a packing body using the packing member and the pallet.

BACKGROUND ART

As disclosed in Unexamined Japanese Patent Publication No. 2004-18085, a conventional packing member utilizes and engages a protrusion of an object to be packed, thereby stabilizing the object.

The conventional packing member is demonstrated hereinafter with reference to the accompanying drawings.

Fig. 9 is a perspective view of the packing member disclosed in Unexamined Japanese Patent Publication No. 2004-18085.

In Fig. 9, for example, packing member 5 is made of durable material, whose raw material is low foaming resin, and molded integrally by using injection molding. Packing member 5 is formed of outer frame part 7 structured in a square shape and a plurality of holding parts 9 provided in outer frame part 7 in forward and backward directions.

Holding part 9 is formed of engaging part 10 for engaging foot part 12 of one end of compressor 1 as the object to be packed and holding part 14 for holding foot part 13 of the other end of compressor 1. Two engaging parts 10 and two holding parts 14 are formed at one holding part 9 at intervals.

Four foot parts 12 and four foot parts 13 of compressor 1 are formed in a peripheral direction of a main body of the compressor. In these foot parts, two foot parts 12 correspond to engaging parts 10, and two foot parts 13 correspond to holding parts 14. Each of engaging parts 10 is formed in a groove shape, thereby restricting foot part 12 in forward and backward directions and a width direction of compressor 1.

Opening 15 is formed between engaging part 10 and holding part 14, and between engaging part 10 and outer frame part 7. By using these structures, packing member 5 is entirely formed in a lattice pattern. In addition, holding parts 9 are provided at an upper and a lower surface of packing member 5.

In a case where compressor 1 is packed by using packing member 5 constructed above, a plurality of packing members 5 are piled in upper and lower directions via compressor 1. Upper foot part 12 of compressor 1 is engaged with engaging part 10 of a lower face side of upper packing member 5, and lower foot part 12 of compressor 1 is engaged with engaging part 10 of an upper face side of lower packing member 5, so that each compressor 1 is securely held by packing member 5.

However, in a case of using conventional packing member 5, foot parts 12 of compressor 1 are engaged securely with engaging parts 10 of upper and lower packing member 5. Therefore, to remove compressor 1, compressor 1 has to be raised substantially vertically with respect to packing member 5, so that it is difficult to remove. Because compressor 1 generally weighs several kilograms to ten-odd kilograms, a severe burden is imposed on a worker, so that workability is not efficient.

Furthermore, packing member 5 is provided with opening 15, so that packing member 5 is entirely formed in a lattice pattern. As a result, a worker who has raised compressor 1 away from him/her can not move it by sliding on a

surface of packing member 5. Thus, the worker has to remove it while it is raised, so that a severe burden is imposed on him/her.

SUMMARY OF THE INVENTION

According to a packing member of the present invention, to solve the conventional problem discussed above, a plurality of substantially spherical objects to be packed are formed so as to be capable of being deposited horizontally, and in addition, a packing body can be formed by piling the packing members and the objects alternately. The packing member includes a recessed accommodating part for accommodating the object, and the accommodating part has a slope in such a manner that its opening extends upward. Because it has the slope, the object can be removed by pulling it laterally. Therefore, the worker can remove the object from the packing member without operation for raising the object upward.

According to the packing member of the present invention, the worker can remove the object from the packing member without raising the object upward, so that the work to remove the object can be easily performed.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a packing member in accordance with a first exemplary embodiment of the present invention.

Fig. 2 is a side view of a packing body in accordance with the first exemplary embodiment of the present invention.

Fig. 3 is a perspective view of an object to be packed in accordance with the first exemplary embodiment of the present invention.

Fig. 4 is a bottom view of the object to be packed in accordance with the first exemplary embodiment of the present invention.

Fig. 5 is a top view showing a unit of an essential part of the packing member in accordance with the first exemplary embodiment of the present invention.

Fig. 6 is a sectional view showing the unit of the essential part of the packing member in accordance with the first exemplary embodiment of the present invention.

Fig. 7 is a side view of a packing body in accordance with a second exemplary embodiment of the present invention.

Fig. 8 is an enlarged view showing a detail of a shaft in accordance with the second exemplary embodiment of the present invention.

Fig. 9 is a perspective view of a conventional packing member.

REFERENCE MARKS IN THE DRAWINGS

101, 201	packing member
102	accommodating part
103	compressor
107, 207	pallet
109, 209	packing body
112	top part
120	foot part
150	depressed part
152	keeping part
154	hollow part
160	dent
162	protruding part
166	slide rail part
290	shaft

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to a packing member of the present invention, a plurality of substantially spherical objects to be packed are formed from a sheet-like synthetic resin board by heat press so as to be capable of being deposited horizontally. In addition, a packing body can be formed by piling the packing members and the objects alternately. The packing member includes a recessed accommodating part for accommodating the object. Because the accommodating part has a slope in such a manner that its opening area increases upward from a bottom, a worker can remove the object by pulling it laterally. Accordingly, the worker can remove the object from the packing member without raising the object upward, so that the work to remove the object can be easily performed.

According to the packing member of the present invention, a depth from an upper end face of the packing member to a bottom of an accommodating part is not higher than 25 % of overall height of an object to be packed. Therefore, the object can be removed easily, so that the work to remove the object can be easily performed further.

According to the packing member of the present invention, a keeping part for keeping space between a bottom of an object to be packed at an upper position and a top part of an object to be packed at a lower position is provided. Because a hollow part is formed at the keeping part in such a manner that space exists between the objects, the space serves as a cushion, thereby preventing the object from trouble in transit.

According to the packing member of the present invention, a slide rail part is formed across opposite sides of the packing member at an upper end face. A worker can move an object detached from the accommodating part toward

him/her by sliding it on the slide rail part, so that the work to remove the object can be easily performed further. For example, the slide rail part may be a groove formed at the upper end face, and may be formed by attaching a rail shaped member.

The packing member of the present invention has a protruding part for supporting a periphery of a top part of an object to be packed at its lower surface, and the protruding part extends a position near a maximum outer diameter of a periphery of the object. Therefore, positional deviation between the object and the packing member can be prevented, and objects having different heights can be packed.

A packing body of the present invention is structured by piling an object to be packed, a packing member and a pallet forming a base section of the packing body. In addition, a shaft penetrates through a substantially center of the packing member, and a packing member positioned at the top and the pallet are sandwiched from both ends of the shaft. An object, which tends to be deviated in loading/unloading, near a center can be stabilized. Therefore, the packing body, where collapse of piled loads is hard to occur, can be realized.

Exemplary embodiments of the present invention are demonstrated hereinafter with reference to the accompanying drawings. These embodiments do not limit the present invention.

FIRST EXEMPLARY EMBODIMENT

Fig. 1 is a perspective view of a packing member in accordance with the first exemplary embodiment of the present invention. Fig. 2 is a side view thereof. Fig. 3 is a perspective view of an object to be packed in accordance with the first exemplary embodiment. Fig. 4 is a bottom view thereof. Fig. 5 is a top view showing a unit of an essential part of the packing member in

accordance with the first exemplary embodiment. Fig. 6 is a sectional view thereof.

Packing member 101 is formed of a sheet-like synthetic resin board. Vacuum forming, heat press or the like can be used as the forming. On a top surface of packing member 101, accommodating part 102 is formed in such a manner that a plurality of compressors 103, which are objects to be packed, are capable of being deposited horizontally. Packing member 101 and compressor 103 are piled alternately on pallet 107, and bundled by band 105, so that packing body 109 shown in Fig. 2 is formed.

As shown in Figs. 3 and 4, compressor 103, which is the object to be packed, has a structure being enclosed by substantially hemispherical upper shell 111 and lower shell 115. Each of top part 112 of upper shell 111 and bottom part 116 of lower shell 115 has a spherical shape. Some of upper shells 111 have different heights, however, maximum outer diameters of all upper shells 111 are identical.

Lower shell 115 has a pair of foot parts 120, which expands in a substantially horizontal direction, for fixing compressor 103 to a product. In addition, tube 122 to be coupled with the product and electric part 124 for installing an electric component are formed at lower shell 115. Projected-engaging part 127 for engaging a component is welded to top part 112 of upper shell 111.

Different shapes of outer peripheries of foot parts 120 and projected-engaging parts 127 exist depending on types of compressors 103. Besides, there is a type without projected-engaging parts 127.

Four small protrusions 130, which protrude downward from below a periphery of bottom part 116 of lower shell 115, are formed at foot part 120. Bottom part 116 of compressor 103 is unstable because of its spherical surface

shape. Therefore, foot part 120 works as a temporary foot for preventing compressor 103 from being overturned when it is disposed on a level surface.

As shown in Figs. 5 and 6, packing member 101 includes recessed accommodating part 102 for mainly accommodating a periphery of lower shell 115 of compressor 103. Depressed part 150, whose shape fits the spherical surface of bottom part 116 of compressor 103, is formed at a center of accommodating part 102. Keeping part 152, which keeps space between bottom part 116 of compressor 103 at an upper position and top part 112 of compressor 103 accommodated at a lower position, is formed at depressed part 150. Hollow part 154 is formed at keeping part 152 in such a manner that space exists between compressors 103. In addition, a downward concave part for accommodating projected-engaging part 127 is formed at a center of keeping part 152.

Dent 160 for accommodating foot part 120 is formed outside depressed part 150.

Each of depressions such as depressed part 150 and dent 160 forming accommodating part 102 has a slope in such a manner that its opening area increases upward from a bottom of the accommodating part. In a word, it has a cross section expanding upward. Further, a maximum depth from an upper end face of the packing member to accommodating part 102 is not higher than 25 % of overall height of compressor 103.

Packing member 101 further includes a plurality of protruding parts 162 for supporting a periphery of top part 112 of substantially hemispherical upper shell 111. Protruding parts 162 is formed in such a manner that compressor 103 and packing member 101 located above compressor 103 do not deviate in a lateral direction. In addition, as shown in Fig. 6, protruding parts 162 extend downward a position near a maximum outer diameter of upper shell 111 of

compressor 103.

Still further, between accommodating parts 102, groove shaped slide rail part 166 is formed across opposite sides of the packing member at an upper end face of packing member 101.

Pallet 107 is an injection molding product of synthetic resin material, and accepts weight of compressor 103 and packing member 101 both of which are loaded on pallet 107. Therefore, pallet 107 has an enough thickness to withstand the weight in rigidity. The necessary thickness is determined based on the synthetic resin material to be used. Besides, supporting leg 180 extending downward is provided at a bottom of pallet 107.

Working processes of forming packing body 109 are demonstrated hereinafter by using packing member 101 and pallet 107 constructed above.

First, a certain number of compressors 103 are loaded on accommodating parts (not shown) of pallet 107, and covered with packing member 101. Next, a certain number of compressors 103 are loaded on accommodating parts 102 of packing member 101, and covered with packing member 101 further. Packing member 101 and compressor 103 are piled alternately by repeating the process mentioned above. Last, the top is covered with packing member 101, and bundled with pallet 107 by using band 105, so that packing body 109 shown in Fig. 2 is formed.

Packing member 101 includes keeping part 152 for keeping space between bottom part 116 of compressor 103 and top part 112 of compressor 103. Keeping part 152 includes hollow part 154 in such a manner that space exists between upper compressor 103 and lower compressor 103. Hollow part 154 has an effect of absorbing a shock generated when packing body 109 is transported or dropped. Accordingly, a molding product made of resin form or the like having shock absorption becomes unnecessary, so that packing member

101 can be formed of the thin sheet-like synthetic resin board. As a result, thin and inexpensive packing member 101 can be realized.

Protruding parts 162, which is formed at a lower surface of packing member 101, can prevent compressor 103 and packing member 101 located above compressor 103 from being deviated in a lateral direction. Some of upper shells 111 have different heights depending on their models, however, maximum outer diameters of all upper shells 111 are substantially identical. Protruding parts 162 extends downward the position near the maximum outer diameter of upper shell 111 of compressor 103, so that identical packing members can be used for models having different heights. Therefore, manufacturing efficiency improves.

Next, a process of removing compressor 103 from packing body 109 is discussed hereinafter.

First, band 105 of the packing body is cut, and packing member 101 of the top surface is removed. Then, compressor 103 is removed. After removing all compressors 103 at one layer, packing member 101 of the top surface at that time is removed. Compressor 103 can be removed from packing body 109 by repeating the process mentioned above.

Each of depressions such as depressed part 150 and dent 160 forming accommodating part 102 has a slope in such a manner that its opening area increases upward. For example, sloping parts 163 or the like shown in Fig. 6 are formed by such a structure discussed above. In a word, an opening area of accommodating part 102 increases from a deep part to a shallow part, so that a worker can remove compressor 103 from accommodating part 102 by pulling compressors 103 laterally. Therefore, the worker can remove the object to be packed from the packing member without raising the object in a vertical direction. Further, maximum depth of accommodating part 102 from an upper

end face of packing member 101 is set not higher than 25 % of overall height of compressor 103, so that compressor 103 can be removed from accommodating part 102 by picking up compressor 103 slightly. Therefore, the work to remove compressor 103 can be easily performed.

Still further, slide rail part 166 is formed at an upper end face of packing member 101. The worker can move compressor 103 detached from accommodating part 102 toward his/her side by sliding it on slide rail part 166, so that he/she can raise compressor 103 after pulling it near him/her. Therefore, the worker does not need to bend his/her waist and raise an object away from him/her. As a result, a workload is reduced remarkably.

As discussed above, according to the present embodiment, the work to remove the object to be packed can be easily performed by using the packing member.

SECOND EXEMPLARY EMBODIMENT

Fig. 7 is a side view of a packing body in accordance with the second exemplary embodiment of the present invention. Fig. 8 is an enlarged view showing a detail of a shaft in accordance with the second exemplary embodiment. In these drawings, the elements similar to those shown in the first exemplary embodiment have the same reference marks, and the descriptions of those elements are omitted here.

Packing body 209 is constructed by piling compressor 103 and packing member 201 alternately on pallet 207, and bundling by band 105.

Excepting through hole 296 where shaft 290 penetrates through a substantially center of packing member 201, packing member 201 in the second embodiment has the identical structure with packing member 101 described in the first embodiment. Pallet 207 includes screw hole 294 of which shaft 290 is

fixed to a substantially center. Shaft 290 has screw part 298 for screwing and fixing into screw hole 294 at its lower end, and has brim part 299 for pressing washer 292 at its upper end.

Next, working processes of forming packing body 209 in the second embodiment are demonstrated hereinafter.

First, a certain number of compressors 103 are loaded on pallet 207, and covered with packing member 201. Then, a certain number of compressors 103 are loaded on packing member 201, and covered with next packing member 201. Packing member 201 and compressor 103 are piled alternately by repeating the process mentioned above. After the top is covered with packing member 201, they are bundled with pallet 207 by using band 105.

After that, shaft 290 penetrates via washer 292 from above packing member 201 covered at the top, and screw part 298 is screwed and fixed into screw hole 294. As a result, packing members 201 are sandwiched from both ends of shaft 290.

When only bundling of band 105 is used, there is a case where power at a center position is weak, and packing member 201 is raised at the center, so that compressor 103 tends to jolt. Therefore, by sandwiching packing members 201 using washer 292 and pallet 207 from both ends of shaft 290, the packing members are prevented from being raised. As a result, the packing body, where collapse of piled loads is hard to occur and which is further stable, can be realized.

INDUSTRIAL APPLICABILITY

As discussed above, according to a packing member, a pallet and a packing body of the present invention, work to remove an object to be packed can be easily performed. Therefore, this invention can be widely applied to an

object having a similar shape to be packed besides a compressor.